CLAIMS

1. A document processing system comprising:

an input receptacle for receiving documents;

a full image scanner;

a transport mechanism coupled to said input receptacle for receiving said documents from said input receptacle and transporting said documents past said full image scanner;

an output receptacle for receiving said documents from said transport mechanism after being transported past said full image scanner;

said full image scanner including means for obtaining a full video image of said documents, means for obtaining a image of a selected area of said documents, and means for obtaining information contained in said selected area of said document; and

a system controller coupled to said transport mechanism for directing the flow of documents through said transport mechanism.

2. The document processing system of claim 1 wherein said output receptacle is a single bin.

3. The document processing system of claim 1 wherein said output receptacle is a plurality of bins.

4. The document processing system of claim 1 further comprising means for communicating operational instructions from said controller to a user.

5. The document processing system of claim 1 further comprising means for communicating with an outside accounting system, said means coupled to said controller, said outside accounting system processing said information concerning said documents substantially immediately.

6. The document processing system of claim 1 further comprising means for sending the full image of said document to an outside accounting system, said means coupled to said controller.

7 The document processing system of claim 6 wherein said outside accounting system is a deposit system.

8. The document processing system of claim 6 wherein said outside accounting system is a payment system.

9. The document processing system of claim 1 wherein said documents have wide and narrow dimensions and said documents are scanned along said narrow dimension.

10. The document processing system of claim 1 wherein said documents have wide and narrow dimensions and said documents are scanned along said wide dimension

11. The document processing system of claim 1 further including a discrimination unit, said discrimination unit including means for determining the authenticity of said document, said transport, mechanism moving documents past said discrimination unit.

12. The document processing system of claim 1 wherein said documents are financial institution documents and currency

13. The document processing system of claim 12 wherein said financial institution documents are checks and deposit slips.

14. The document processing system of claim 12 wherein said financial institution documents are transfer slips.

15. The document scanning system of claim 1 wherein said documents have first and second surfaces and said documents are scanned on first and second surfaces.

16. The document processing system of claim 1 further including counterfeit detection means, said counterfeit detection means including a magnetic sensor for reading magnetic ink from said document.

17. A currency processing system comprising:

an input receptacle for receiving currency;

a full image scanner;

a transport mechanism coupled to said input receptacle for receiving said currency from said input receptacle and transporting said currency past a full image scanner and a discrimination unit;

an output receptacle for receiving said currency from said transport mechanism after being transported past said full image scanner and discrimination unit;

said full image scanner including means for obtaining a full video image of said currency, means for obtaining a image of a selected area of said currency, and means for obtaining information contained in said selected area of said currency;

said discrimination unit including means for determining the authenticity of said currency; and

a system controller coupled to said transport mechanism for directing the flow of currency on said transport mechanism.

18. The currency processing system of claim 17 wherein said output receptacle is a single bin.

19. The currency processing system of claim 17 wherein said output receptacle is a plurality of bins.

20. The currency processing system of claim 17 further comprising means for communicating operational instructions from said controller to a user.

21. The currency processing system of claim 17 further comprising means for communicating with an outside accounting system, said means coupled to said controller.

22. The currency processing system of claim 17 wherein said currency has wide and narrow dimensions and said documents are scanned along said narrow dimension.

23. The currency processing system of claim 17 wherein said currency has wide and narrow dimensions and said documents are scanned along said wide dimension.

24. The currency processing system of claim 17 wherein said currency comprises first and second sides and said full image scanner obtains an image of said first and second sides.

25. The currency processing system of claim 17 wherein said currency comprises first and second sides and said full image scanner obtains an image of a selected one of said first and second sides.

26. A check processing system comprising:

an input receptacle for receiving checks;

a full image scanner;

a transport mechanism coupled to said input receptacle for receiving said checks from said input receptacle and transporting said checks past a full image scanner;

an output receptacle for receiving said checks from said transport mechanism after being transported past said full image scanner;

said full image scanner including means for obtaining a full video image of said checks, means for obtaining a image of a selected area of said checks, and means for obtaining information contained in said selected area of said checks;

means for receiving customer identification and means for authenticating said customer identification;

means for dispensing and distributing funds after authenticating said customer authentication; and

a system controller coupled to said transport mechanism for directing the flow of checks on said transport mechanism.

27. The check processing system of claim 26 wherein said output receptacle is a single bin.

28. The check processing system of claim 26 wherein said output receptacle is a plurality of bins.

29. The check processing system of claim 26 further comprising means for communicating operational instructions from said controller to a user.

30. The check processing system of claim 26 further comprising means for communicating with an outside accounting system, said means coupled to said controller.

31. The check processing system of claim 26 wherein said check has wide and narrow dimensions and said documents are scanned along said narrow dimension.

32. The check processing system of claim 26 wherein said check has wide and narrow dimensions and said documents are scanned along said wide dimension.

33 The check processing system of claim 26 wherein said customer identification comprises an electronic image containing information containing the bank and identity of said customer.

34. The check processing system of claim 26 wherein said customer identification comprises a slip of paper containing information containing the bank and identity of said customer.

35. The check processing system of claim 26 wherein said checks have first and second surfaces and said checks are scanned on first and second surfaces.

36. A currency processing system comprising:

an input receptacle for receiving currency;

a full image scanner;

a transport mechanism coupled to said input receptacle for receiving said currency from said input receptacle and transporting said currency past a full image scanner and a discrimination unit;

an output receptacle for receiving said currency from said transport mechanism after being transported past said full image scanner and discrimination unit;

said full image scanner including means for obtaining a full video image of said currency, means for obtaining a image of a selected area of said currency, and means for obtaining information contained in said selected area of said currency, said information representing the value of said currency;

said discrimination unit including means for determining the authenticity of said currency;

means for communicating operational instructions from said controller to the user;

means for communicating with an outside accounting system coupled to said controller, said outside accounting system processing said information representing the value of said currency substantially immediately; and

a system controller coupled to said transport mechanism for directing the flow of currency on said transport mechanism.

37. A method for processing documents comprising the steps of:

receiving documents in an input receptacle;

transporting said documents from said input receptacle past a full image scanner and a discrimination unit;

receiving said documents in an output receptacle from said transport mechanism after being transported past said full image scanner and discrimination unit;

obtaining a full video image of said documents, obtaining a image of a selected area of said documents, and obtaining information contained in said selected area of said document;

determining the authenticity of said document; and

directing the flows of documents on said transport mechanism.

38. A system for processing currency comprising:

an input receptacle for receiving currency from a user;

a full image scanner;

a transport mechanism coupled to said input receptacle for receiving said currency from said input receptacle and transporting said currency past a full image scanner and a discrimination unit;

a system controller coupled to said transport mechanism for directing the flow of currency on said transport mechanism.

a single output bin for receiving said currency from said transport mechanism after being transported past said full image scanner and discrimination unit;

said full image scanner including means for obtaining a full video image of said currency, means for obtaining a image of a selected area of said currency, and means for obtaining information contained in said selected area of said currency;

said discrimination unit including means for determining the authenticity of said currency; and

communication means for communicating operational instructions and a full video image from said controller to the user said communication means coupled to said controller.

39. The system of claim 38 wherein said currency has wide and narrow dimensions and said documents are scanned along said narrow dimension.

40. The system of claim 38 wherein said currency has wide and narrow dimensions and said documents are scanned along said wide dimension.

41. A system for processing financial institution documents comprising:

a multitude of compact full-image processing units communicatively coupled together to form a network each of said full image processing units comprising: an input receptacle for receiving financial institution documents; a full image scanner; a transport mechanism coupled to said input receptacle for receiving said documents from said input receptacle and transporting said documents past a full image scanner and a discrimination unit; an output receptacle for receiving said documents from said transport mechanism after being transported past said full image scanner and discrimination unit; said full image scanner including means for obtaining a full video image of said documents, means for obtaining a image of a selected area of said documents, and means for obtaining information from said image of said selected area of said documents; said discrimination unit including means for determining the authenticity of said documents; and a system controller coupled to said transport mechanism for directing the flow of documents on said transport mechanism.

42. The system of claim 41 wherein said output receptacle is a single bin.

43. The system of claim 41 wherein said output receptacle is a plurality of bins.

44. The system of claim 41 further comprising means for communicating operational instructions from said controller to a user.

45. The system of claim 41 further comprising means for communicating with an outside accounting system, said means coupled to said controller, said outside accounting system storing, tracking, and analyzing said information from said full-image processing units.

46. The system of claim 41 further comprising a discriminator for authenticating said financial institution documents, said transport means moving said documents past said discriminator.

47. The system of claim 41 wherein said documents have wide and narrow dimensions and said documents are scanned along said wide dimension.

48. The system of claim 41 wherein said documents have wide and narrow dimensions and said documents are scanned along said narrow dimension.

49 The system of claim 41 wherein said multitude of units are located at teller windows, retailers, and financial institutions.

50. The system of claim 41 wherein said financial institution documents comprise checks and deposit slips.

51 A system for processing financial institution documents comprising:

a multitude of image processing units communicatively coupled together to form a network, said units processing financial institution documents deposited by users, said units comprising an input receptacle for receiving financial institution documents; a full image scanner; a transport mechanism coupled to said input receptacle for receiving said documents from said input receptacle and transporting said documents past said full image scanner; an output receptacle for receiving said documents from said transport mechanism after being transported past said full image scanner; said full image scanner including means for obtaining a full video image of said documents, means for obtaining a image of a selected area of said documents, and means for obtaining information contained in said selected area of said documents; and a system controller coupled to said transport mechanism for directing the flow of documents on said transport mechanism; means for communicating said information contained in selected areas of said document to an outside accounting system, said means coupled to said controller wherein deposits and withdrawals from said accounting system are processed substantially immediately

52. The system of claim 51 wherein said output receptacle is a single bin.

53 The system of claim 51 wherein said output receptacle is a plurality of bins.

54. The document processing system of claim 51 wherein said outside accounting system is a deposit system.

55. The document processing system of claim 51 wherein said outside accounting system is a withdrawal system.

56. The system of claim 51 further comprising teller monitor coupled to said system controller.

57. The system of claim 51 wherein said documents have wide and narrow dimensions and said documents are scanned along said wide dimension.

58. The system of claim 51 wherein said documents have wide and narrow dimensions and said documents are scanned along said narrow dimension.

59 A document processing system comprising:

a document processor comprising an input receptacle for receiving documents; a full image scanner; a transport mechanism coupled to said input receptacle for receiving said documents from said input receptacle and transporting said documents past said full image scanner and a discrimination unit; an output receptacle for receiving said documents from said transport mechanism after being transported past said full image scanner and discrimination unit; said full image scanner including means for obtaining a full video image of said documents, means for obtaining a image of a selected area of said documents, and means for obtaining information contained in said selected area of said document; said discrimination unit including means for determining the authenticity of said document; a controller coupled to said transport mechanism for directing the flow of documents through said transport mechanism; and

a central processing unit located at a central location; said unit coupled to said document processor for processing and storing information concerning said documents.

60. The document processing system of claim 59 wherein said central processing unit and said document processor are coupled by a two-way communication link, said link allowing two-way audio communication between said central processing unit and said document processor.

61. The document processing system of claim 59 wherein a video terminal is coupled to said central processing unit for displaying full video images of said documents.

62. The document processing system of claim 59 further including a module for accepting a smart card and means for obtaining information from said smart card.

63. The document processing system of claim 59 wherein said documents are checks.

64. The document processing system of claim 59 wherein said documents are currency.

65. The document processing system of claim 59 wherein said output receptacle is a single bin.

66. The document processing system of claim 59 wherein said output receptacle is a plurality of bins.

67. The document processing system of claim 59 further comprising means for communicating operational instructions from said controller to a user.

68. The document processing system of claim 59 further comprising means for communicating with an outside accounting system, said means coupled to said controller, said outside accounting system processing said information concerning said documents substantially immediately.

69. The document processing system of claim 59 further comprising means for sending the full image of said document to an outside accounting system, said means coupled to said controller.

70. The document processing system of claim 59 wherein said documents have wide and narrow dimensions and said documents are scanned along said narrow dimension.

71. The document processing system of claim 59 wherein said documents have wide and narrow dimensions and said documents are scanned along said wide dimension.

72. The document processing system of claim 59 wherein said documents are financial institution documents and currency.

73. The document processing system of claim 59 wherein said financial institution documents are checks and deposit slips.

74. A currency processing system comprising:

an input receptacle for receiving currency;

a full image scanner;

a transport mechanism coupled to said input receptacle for receiving said currency from said input receptacle and transporting said currency past a full image scanner;

an output receptacle for receiving said currency from said transport mechanism after being transported past said full image scanner;

said full image scanner including means for obtaining a full video image of said currency, means for obtaining a image of a selected area of said currency, and means for obtaining information contained in said selected area of said currency; and

a system controller coupled to said transport mechanism for directing the flow of currency on said transport mechanism.

75. The system of claim 74 wherein said currency has wide and narrow dimensions and said currency is scanned along said narrow dimension.

76. The system of claim 74 wherein said currency has wide and narrow dimensions and said currency is scanned along said wide dimension.

77. The currency processing system of claim 74 wherein said output receptacle is a single bin.

78. A financial institution document processing system comprising:

an input receptacle for receiving financial institution documents;

a full image scanner;

a transport mechanism coupled to said input receptacle for receiving said documents from said input receptacle and transporting said documents past a full image scanner;

only two output receptacles for receiving said documents from said transport mechanism after being transported past said full image scanner;

said full image scanner including means for obtaining a full video image of said documents, means for obtaining a image of a selected area of said documents, and means for obtaining information contained in said selected area of said documents; and

a system controller coupled to said transport mechanism for directing the flow of documents on said transport mechanism.

79. The system of claim 78 wherein said financial institution documents have wide and narrow dimensions and said currency is scanned along said narrow dimension.

80. The system of claim 78 wherein said financial institution documents have wide and narrow dimensions and said currency is scanned along said wide dimension.

81. The system of claim 78 wherein said financial institution documents include checks and deposit slips.

82. The system of claim 78 wherein said financial institution documents are chosen from the group consists of mortgage payment slips, coupons, savings deposit slips.

83. A method for processing documents comprising the steps of:

receiving documents in an input receptacle;

transporting said documents from said input receptacle past a full image scanner and a discrimination unit,

receiving said documents in an output receptacle from said transport mechanism after being transported past said full image scanner and discrimination unit;

obtaining a full video image of said documents, obtaining a image of a selected area of said documents, and obtaining information contained in said selected area of said document;

processing unidentified documents;

providing a central office computer;

coupling said central office computer to said full image scanner;

providing a teller monitor;

coupling said teller monitor to said full image scanner;

determining the authenticity of said document; and

directing the flows of documents on said transport mechanism.

84. The method of claim 83 wherein said step of processing unidentified documents includes displaying the image on the teller monitor and having the teller enter any missing information.

85. The method of claim 83 wherein said step of processing unidentified documents includes displaying said image on said central office computer and having an operator at said computer enter missing information.

86. The method of claim 83 wherein the step of processing unidentified documents includes having the customer hold onto the documents.

87. The method of claim 83 wherein the step of processing unidentified documents includes having the customer enter the amount on the keypad and depositing them in an envelop.

88. The method of claim 83 which includes the further step of accepting identification from a customer and returning currency to the customer in response to a valid identification.

89. The method of claim 83 wherein said document is currency and including the further step of a teller entering missing data.

90. The method of claim 83 wherein said document is currency and including the further step of a teller removing unreadable documents from the output receptacle.

91. The method of claim 90 including the further step of a teller entering missing data.

92. The method of claim 83 wherein said document is a financial institution document and including the further step of a teller removing unreadable documents from the output receptacle

93. The method of claim 92 including the further step of a teller entering missing data.

94. The method of claim 83 wherein said document is a check and including the further step of a teller removing unreadable documents from the output receptacle.

95. The method of claim 94 including the further step of a teller entering missing data.

96. A document evaluation device for receiving a stack of documents and rapidly evaluating all the documents in the stack, said device comprising:

an input receptacle for receiving a stack of documents to be evaluated;

a single output receptacle for receiving said documents after said documents have been evaluated;

a transport mechanism for transporting said documents, one at a time, from said input receptacle to said output receptacle along a transport path;

a full image scanner for evaluating and identifying said documents, said full image scanner including a detector positioned along said transport path between said input receptacle and said output receptacle; and

means for flagging a document when the identity of said document is not determined by said full image scanner.

97. The document evaluation device of claim 96 wherein said means for flagging causes said transport mechanism to halt with said document whose identity has not been determined being the last document transported to said output receptacle.

98. The document evaluation device of claim 97 wherein said detector of said full image scanner includes a stationary optical scanning head for scanning the whole of each document transported between said input and output receptacles by said transport mechanism, and producing an output signal representing the scanned image and wherein said full image scanner includes signal processing means for receiving said output signal and determining the identity of each scanned document.

99. The document evaluation device of claim 96 wherein said detector of said full image scanner includes a stationary optical scanning head for scanning the whole of each document transported between said input and output receptacles by said transport mechanism, and producing an output signal representing the scanned image and wherein said full image scanner includes signal processing means for receiving said output signal and determining the identity of each scanned document.

100. A document evaluation device for receiving a stack of documents and rapidly evaluating all the documents in the stack, said device comprising:

an input receptacle for receiving a stack of documents to be evaluated, genuine ones of said documents each having one of a plurality of images thereon, said plurality of images defining a plurality of document types;

a single output receptacle for receiving said documents after said documents have been evaluated;

a transport mechanism for transporting said documents, one at a time, from said input receptacle to said output receptacle along a transport path;

a full image scanner for evaluating said documents, said full image scanner including a detector positioned along said transport path between said input receptacle and said output receptacle, said full image scanner being capable of distinguishing among said plurality of document types by scanning the image on each of said documents, said full image scanner counting and determining the document type of said documents; and

means for flagging a document when the type of said document is not determined by said full image scanner.

101. A currency identification system for receiving a stack of currency bills, rapidly counting and evaluating all the bills in the stack, and then delivering the bills to a single output receptacle comprising:

a bill transport mechanism for transporting bills, one at a time, from an input receptacle past a scanning section to a single output receptacle at a rate in excess of about 800 bills per minute;

said scanning section comprising at least two first-side sensors positioned so as to permit scanning of a bill along at least two laterally displaced segments on a first side of said bill, said first-side sensors being capable of detecting characteristic information from said bill along said segments and generating corresponding output signals representing analog variations in the detected characteristic information from which analog scanned patterns of characteristic information may be generated, at least two of said sensors being laterally displaced relative to each other, said sensors being able to scan at a rate in excess of about 800 bills per minute, said scanning section including a full image scanner for obtaining a full image of said bills;

means for generating at least one scanned pattern from said output signals, said at least one scanned pattern representing and approximating analog amplitude variations in said characteristic information along a segment of said bill;

a memory for storing at least one master pattern associated with each genuine bill which the system is capable of identifying, said at least one master pattern representing and approximating analog amplitude variations in characteristic information along a segment of an associated genuine bill; and

a signal processing means for performing a pattern comparison wherein at least one of said scanned patterns or portions thereof is compared with at least one of said master patterns or portions thereof; said signal processing means generating an indication of the identity of said bill based on said pattern comparison when said bill is one that the system is capable of identifying.

102. The currency identification system of claim 101 wherein at least two of said sensors are stationary sensors.

103. The currency identification system of claim 102 wherein said stationary sensors are laterally positioned in a symmetrical fashion relative to a central axis of said bill.

104. The currency identification system of claim 102 wherein said stationary sensors are optical sensors.

105. The currency identification system of claim 104

wherein said optical sensors are each contained within one or more scanheads, wherein said one or more scanheads include at least one light source for illuminating a strip of a respective one said at least two segments of said bill, and at least one detector for receiving reflected light from a corresponding illuminated strip on said bill;

wherein said output signals represent variations in the intensity of reflected light;

wherein said means for generating at least one scanned pattern from said output signals comprises means for sampling said output signals at preselected intervals as said bill is moved past a corresponding scanhead, each of said output signal samples being proportional to the intensity of the light reflected from a different strip of a corresponding segment; and

wherein said at least one master pattern is a master pattern of reflected light intensity signal samples.

106. The currency identification system of claim 105 wherein said strips are dimensioned so that at least 50 different strips can be scanned along a corresponding segment.

107. The currency identification system of claim 105 wherein said segments are each scanned in less than one tenth of a second.

108. The currency identification system of claim 102 further comprising:

a size detection sensor for retrieving size information from said bill;

a memory for storing master size information associated with genuine bills which the system is capable of identifying; and

signal processing means for performing a size comparison wherein said size information of said bill is compared with master size information associated with at least one of the genuine bills which the system is capable of identifying and wherein said identity indication is additionally based on said size comparison.

109. The currency identification system of claim 108 wherein said size information comprises either the length or the width, or both, of said bill.

110. The currency identification system of claim 108 wherein said size detection sensor is positioned upstream from said first-side sensors, wherein said size comparison is performed before said pattern comparison; wherein said signal processing means generates a preliminary set of potential matching bills for said bill based on said size comparison; and wherein said at least one of said master patterns of said pattern comparison is chosen from said preliminary set.

111. The currency identification system of claim 108 wherein said size detection sensor is positioned upstream from said scanheads; wherein said size comparison is performed before said bill is scanned by said scanheads; wherein said signal processing means generates a preliminary set of potential matching bills for said bill based on said size comparison; and wherein one or more of said scanheads are selected to scan said bill based on said size comparison or the output signals from one or more of said scanheads or derivations thereof are selected for the generation of scanned patterns based on said size comparison.

112. The currency identification system of claim 111 wherein said at least one of said master patterns of said pattern comparison is chosen from said preliminary set.

113. The currency identification system of claim 112 wherein said stationary scanheads are laterally positioned in a symmetrical fashion relative to a central axis of said bill.

114. The currency identification system of claim 112

wherein said stationary scanheads are optical scanheads;

wherein said optical scanheads each include at least one light source for illuminating a strip of said segments of said bill, and at least one detector for receiving reflected light from a corresponding illuminated strip on said bill;

wherein said output signals represent variations in the intensity of reflected light;

wherein said means for generating at least one scanned pattern from said output signals comprises means for sampling said output signals at preselected intervals as said bill is moved past a corresponding scanhead, each of said output signal samples being

proportional to the intensity of the light reflected from a different strip of a corresponding segment; and

wherein said at least one master pattern is a master pattern of reflected light intensity signal samples.

115. The currency identification system of claim 113 wherein said stationary scanheads are laterally positioned in a symmetrical fashion relative to a central axis of said bill.

116. The currency identification system of claim 102 further comprising:

a color detection sensor for retrieving color information from said bill;

a memory for storing master color information associated with genuine bills which the system is capable of identifying; and

signal processing means for performing a color comparison wherein said color information of said bill is compared with master color information associated with at least one of the genuine bills which the system is capable of identifying and wherein said identity indication is additionally based on said color comparison.

117 The currency identification system of claim 116 wherein said color detection sensor is positioned upstream from said first-side sensors; wherein said color comparison is performed before said pattern comparison; wherein said signal processing means generates a preliminary set of potential matching bills for said bill based on said color comparison; and wherein said at least one of said master patterns of said pattern comparison is chosen from said preliminary set.

118. The currency identification system of claim 116 wherein said color detection sensor is positioned upstream from said first-side sensors; wherein said color comparison is performed before said bill is scanned by said first-side sensors; wherein said signal processing means generates a preliminary set of potential matching bills for said bill based on said color comparison; and wherein one or more of said first-side sensors are selected to scan said bill based on said color comparison or the output signals from one or more of said first-side sensors or derivations thereof are selected for the generation of scanned patterns based on said color comparison.

119. The currency identification system of claim 118 wherein said at least one of said master patterns of said pattern comparison is chosen from said preliminary set.

120 The currency identification system of claim 118 wherein said first-side sensors are laterally positioned in a symmetrical fashion relative to a central axis of said bill.

121. The currency identification system of claim 119

wherein said first-side sensors are optical sensors;

wherein said optical sensors are each contained within one or more scanheads, wherein said one or more scanheads include at least one light source for illuminating a strip of a respective one of said at least two segments of said bill, and at least one detector for receiving reflected light from a corresponding illuminated strip on said bill;

wherein said output signals represent variations in the intensity of reflected light;

wherein said means for generating at least one scanned pattern from said output signals comprises means for sampling said output signals at preselected intervals as said bill is moved past a corresponding scanhead, each of said output signal samples being proportional to the intensity of the light reflected from a different strip of a corresponding segment; and

wherein said at least one master pattern is a master pattern of reflected light intensity signal samples.

122. The currency identification system of claim 121 wherein said first-side sensors are laterally positioned in a symmetrical fashion relative to a central axis of said bill.

123. The currency identification system of claim 119 further comprising:

at least two sensors positioned so as to permit scanning along at least two segments on a second side of said bill, said second-side sensors being capable of detecting characteristic information from said bill along said segments and generating corresponding output signals representing variations in the detected characteristic information from which scanned patterns of characteristic information may be generated, at least two of said second-side sensors being laterally displaced relative to each other;

wherein said second-side sensors are included within said sensor selection or output signal selection.

124. The currency identification system of 123 wherein the output from said color detection sensor is used to determine the face orientation of said bill.

125. The currency identification system of claim 124 wherein (1) said first-side sensors or output signals therefrom or (2) said second-side sensors or output signals therefrom are selected based on said determination of said face orientation.

126. The currency identification system of claim 119 further comprising:

a size detection sensor positioned upstream from said scanheads for retrieving size information from said bill;

a memory for storing master size information associated with genuine bills which the system is capable of identifying; and

signal processing means for performing a size comparison wherein said size information of said bill is compared with master size information associated with at least one of the genuine bills which the system is capable of identifying; wherein said size comparison is performed before said bill is scanned by said scanheads; wherein said generation of said preliminary set of potential matching bills for said bill is additionally based on said size comparison; and wherein said selection of one or more scanheads to scan said bill or the selection of the output signals from one or more scanheads for the generation of scanned patterns is additionally based on said size comparison.

127. The currency identification system of claim 101 wherein at least two of said scanheads are laterally moveable scanheads.

128. The currency identification system of claim 127 wherein said moveable scanheads are laterally positioned in a symmetrical fashion relative to a central axis of said bill.

129. The currency identification system of claim 127 wherein said moveable scanheads are optical scanheads.

130. The currency identification system of claim 129

wherein said optical scanheads each include at least one light source for illuminating a strip of said segments of said bill, and at least one detector for receiving reflected light from a corresponding illuminated strip on said bill;

wherein said output signals represent variations in the intensity of reflected light; wherein said means for generating at least one scanned pattern from said output signals comprise means for sampling said output signals at preselected intervals as a bill is moved past a corresponding scanhead, each of said output signal samples being proportional to the intensity of the light reflected from a different strip of a corresponding segment; and

wherein said at least one master pattern is a master pattern of reflected light intensity signal samples.

131. The currency identification system of claim 130 wherein said strips are dimensioned so that at least 50 different strips can be scanned along a corresponding segment.

132. The currency identification system of claim 130 wherein said segments are each scanned in less than one tenth of a second.

133. The currency identification system of claim 130 further comprising:

a bill transport mechanism for transporting a currency bill to be scanned along a transport path;

a bill separating station for receiving currency bills from a bill accepting station and feeding said bills, one at a time, to said bill transport mechanism, said bill transport mechanism transporting bills from said bill separating station to a stacking station; and

wherein said optical scanheads are located between said bill separating and stacking stations.

134. The currency identification system of claim 133 wherein said bill transport mechanism transports bills from said bill separating station to said bill stacking station at a rate in excess of about 800 bills per minute.

135. The currency identification system of claim 127 further comprising:

a size detection sensor for retrieving size information from said bill;

a memory for storing master size information associated with genuine bills which the system is capable of identifying; and

signal processing means for performing a size comparison wherein said size information of said bill is compared with master size information associated with at least

one of the genuine bills which the system is capable of identifying and wherein said identity indication is additionally based on said size comparison.

136. The currency identification system of claim 135 wherein said size information comprises either the length or the width, or both, of said bill.

137. The currency identification system of claim 135 wherein said size detection sensor is positioned upstream from said scanheads; wherein said size comparison is performed before said pattern comparison; wherein said signal processing means generates a preliminary set of potential matching bills for said bill based on said size comparison; and wherein said at least one of said master patterns of said pattern comparison is chosen from said preliminary set.

138. The currency identification system of claim 135 wherein said size detection sensor is positioned upstream from said scanheads; wherein said size comparison is performed before said bill is scanned by said scanheads; wherein said signal processing means generates a preliminary set of potential matching bills for said bill based on said size comparison; and wherein the lateral positioning of one or more of said moveable scanheads is adjusted based on said size comparison so as to permit scanning of selected segments of said bill.

139. The currency identification system of claim 138 wherein said at least one of said master patterns of said pattern comparison is chosen from said preliminary set.

140. The currency identification system of claim 139 wherein said moveable scanheads are laterally positioned in a symmetrical fashion relative to a central axis of said bill.

141. The currency identification system of claim 139

wherein said moveable scanheads are optical scanheads;

wherein said optical scanheads each include at least one light source for illuminating a strip of said segments of said bill, and at least one detector for receiving reflected light from a corresponding illuminated strip on said bill;

wherein said output signals represent variations in the intensity of reflected light;

wherein said means for generating at least one scanned pattern from said output signals comprises means for sampling said output signals at preselected intervals as said

bill is moved past a corresponding scanhead, each of said output signal samples being proportional to the intensity of the light reflected from a different strip of a corresponding segment; and

wherein said at least one master pattern is a master pattern of reflected light intensity signal samples.

142. The currency identification system of claim 141 wherein said moveable scanheads are laterally positioned in a symmetrical fashion relative to a central axis of said bill.

143. The currency identification system of claim 127 further comprising:

a color detection sensor for retrieving color information from said bill;

a memory for storing master color information associated with genuine bills which the system is capable of identifying; and

signal processing means for performing a color comparison wherein said color information of said bill is compared with master color information associated with at least one of the genuine bills which the system is capable of identifying and wherein said identity indication is additionally based on said color comparison.

144. The currency identification system of claim 143 wherein said color detection sensor is positioned upstream from said scanheads; wherein said color comparison is performed before said pattern comparison; wherein said signal processing means generates a preliminary set of potential matching bills for said bill based on said color comparison; and wherein said at least one of said master patterns of said pattern comparison is chosen from said preliminary set.

145. The currency identification system of claim 143 wherein said color detection sensor is positioned upstream from said scanheads; wherein said color comparison is performed before said bill is scanned by said scanheads; wherein said signal processing means generates a preliminary set of potential matching bills for said bill based on said color comparison; and wherein the lateral positioning of one or more of said moveable scanheads is adjusted based on said color comparison so as to permit scanning of selected segments of said bill.

146. The currency identification system of claim 145 wherein said at least one of said master patterns of said pattern comparison is chosen from said preliminary set.

147. The currency identification system of claim 146 wherein said moveable scanheads are laterally positioned in a symmetrical fashion relative to a central axis of said bill.

148 The currency identification system of claim 146

wherein said moveable scanheads are optical scanheads;

wherein said optical scanheads each include at least one light source for illuminating a strip of said segments of said bill, and at least one detector for receiving reflected light from a corresponding illuminated strip on said bill;

wherein said output signals represent variations in the intensity of reflected light;

wherein said means for generating at least one scanned pattern from said output signals comprises means for sampling said output signals at preselected intervals as said bill is moved past a corresponding scanhead, each of said output signal samples being proportional to the intensity of the light reflected from a different strip of a corresponding segment; and

wherein said at least one master pattern is a master pattern of reflected light intensity signal samples.

149. The currency identification system of claim 148 wherein said moveable scanheads are laterally positioned in a symmetrical fashion relative to a central axis of said bill.

150. The currency identification system of claim 146 further comprising:

at least two scanheads so as to permit scanning along at least two segments on a second side of said bill, said second-side scanheads being capable of detecting characteristic information from said bill along said segments and generating corresponding output signals representing variations in the detected characteristic information from which scanned patterns of characteristic information may be generated, at least two of said second-side scanheads being laterally displaced relative to each other;

wherein said second-side scanheads are included within said scanhead selection or output signal selection.

151. The currency identification system of 150 wherein the output from said color detection sensor is used to determine the face orientation of said bill.

152. The currency identification system of 151 wherein the lateral positioning of one or more of (1) said first-side scanheads or (2) said second-side scanheads is adjusted based on said determination of said face orientation so as to permit scanning of selected segments of said bill.

153. The currency identification system of claim 146 further comprising:

a size detection sensor positioned upstream from said scanheads for retrieving size information from said bill;

a memory for storing master size information associated with genuine bills which the system is capable of identifying; and

signal processing means for performing a size comparison wherein said size information of said bill is compared with master size information associated with at least one of the genuine bills which the system is capable of identifying; wherein said size comparison is performed before said bill is scanned by said scanheads; wherein said generation of said preliminary set of potential matching bills for said bill is additionally based on said size comparison; and wherein said lateral positioning of one or more of said moveable scanheads is adjusted additionally based on said size comparison so as to permit scanning of selected segments of said bill.

154. The currency identification system of claim 101 further comprising:

at least two second-side sensors positioned so as to permit scanning along at least two segments on a second side of said bill, said second-side sensors being capable of detecting characteristic information from said bill along said segments and generating corresponding output signals representing analog variations in the detected characteristic information from which analog scanned patterns of characteristic information may be generated, at least two of said second-side sensors being laterally displaced relative to each other.

155 The currency identification system of claim 154 wherein at least two of said first-side sensors and at least two of said second-side sensors are stationary sensors.

156. The currency identification system of claim 154 wherein at least two of said first-side scanheads and at least two of said second-side scanheads are moveable scanheads.

157 The currency identification system of claim 154 wherein at least two of said first-side sensors and at least two of said second-side sensors are positioned in a symmetrical fashion relative to a central axis of said bill.

158. The currency identification system of claim 154 wherein at least two of said first-side sensors and at least two of said second-side sensors are optical sensors.

159. The currency identification system of claim 158

wherein said optical sensors are each contained within one or more scanheads, wherein said one or more scanheads include at least one light source for illuminating a strip of a respective one of said at least two segments on said first side of said bill and said at least two segments on said second side of said bill, and at least one detector for receiving reflected light from a corresponding illuminated strip on said bill;

wherein said output signals represent variations in the intensity of reflected light;

wherein said means for generating at least one scanned pattern from said output signals comprises means for sampling said output signals at preselected intervals as said bill is moved past a corresponding scanhead, each of said output signal samples being proportional to the intensity of the light reflected from a different strip of a corresponding segment; and

wherein said at least one master pattern is a master pattern of reflected light intensity signal samples.

160. The currency identification system of claim 154 wherein said master patterns are generated by scanning only a single side of genuine bills of the plurality of genuine bills which the system is capable of identifying and wherein a valid identity indication is generated only when a match is found between a scanned pattern generated by scanning one side of said bill and one of said master patterns and no match is found between a scanned pattern generated by scanning the other side of said bill and any of said master patterns.

161. The currency identification system of claim 154 wherein two sets of master patterns are generated for genuine bills which the system is capable of identifying, a first

side set generated by scanning genuine bills on one side thereof and a second side set generated by scanning genuine bills on an opposing side thereof; and wherein a valid identity indication is generated only when a match is found between a scanned pattern generated by scanning one side of said bill and one of said first side master patterns and another match is found between a scanned pattern generated by scanning the other side of said bill and a second side master pattern associated with the bill-type indicated by the first side master patterns comparison.

162. The currency identification system of claim 101 wherein said signal processing means generates a correlation number for each of said pattern comparisons and wherein said indication of the identity of said bill is based upon a determination of which pattern comparison has the highest correlation number.

163. A document counting and discrimination device for receiving a stack of documents, rapidly counting and discriminating the documents in the stack, and then re-stacking the documents comprising:

an input receptacle for receiving a stack of documents to be discriminated;

a full image scanner for obtaining a full image of said documents and for discriminating the value of said documents;

one or more output receptacles for receiving said documents after being discriminated by said full image scanner;

a transport mechanism for transporting said documents, one at a time, from said input receptacle past a sensor of said full image scanner, and to said one or more output receptacles;

one or more counters keeping track of the value of documents discriminated;

value indicating means for an operator of said device to indicate the value of any documents whose value is not determined by said full image scanner, said documents whose value has not determined by said full image scanner being no call documents, said means appropriately effecting said one or more counters; and

a housing for said input receptacle, said full image scanner, said one or more output receptacles, and said transport mechanism; wherein said value indicating means are affixed to said housing.

164 The discrimination device of claim 163 wherein said value indicating means comprise denomination selection elements.

165. The discrimination device of claim 163 having a single output receptacle.

166. The discrimination device of claim 163 having exactly two output receptacles.

167 A currency counting and discrimination device for receiving a stack of currency bills, rapidly counting and discriminating the bills in the stack, and then re-stacking the bills comprising:

an input receptacle for receiving a stack of currency bills to be discriminated;

a full image scanner for discriminating the denomination of said currency bills;

one or more output receptacles for receiving said currency bills after being discriminated by said full image scanner;

a transport mechanism for transporting said currency bills, one at a time, from said input receptacle past a sensor of said full image scanner and to said one or more output receptacles;

one or more counters keeping track of the value of bills discriminated; and

value indicating means for an operator of said device to indicate the value of any bills whose denomination are not determined by said full image scanner, said bills whose denomination are not determined by said full image scanner being no call bills, said means appropriately effecting said one or more counters;

wherein the operation of said device is suspended when said full image scanner is unable to identify the denomination of a bill.

168. The discrimination device of claim 167 having a single output receptacle and wherein the value of a no bill is added to appropriate ones of said one or more counters through the use of said value indicating means when the operation of said device is suspended and wherein the operation of the device is thereafter resumed.

169. The discrimination device of claim 168 wherein said value indicating means comprise denomination selection elements.

170. The discrimination device of claim 167 having exactly two output receptacles and wherein the value of a no bill is added to appropriate ones of said one or

more counters through the use of said value indicating means when the operation of said device is suspended and wherein the operation of the device is thereafter resumed.

171. The discrimination device of claim 170 wherein said value indicating means comprise denomination selection elements.

172. The discrimination device of claim 170 comprising two or more output receptacles and wherein no call bills are delivered to a different one of said output receptacles than bills whose denominations are determined by said full image scanner.

173. The discrimination device of claim 170 further comprising an inspection station and wherein no call bills are delivered to said inspection station.

174. The discrimination device of claim 163 comprising two or more output receptacles and wherein no call bills are delivered to a different one of said output receptacles than bills whose denominations are determined by said full image scanner.

175. The discrimination device of claim 174 wherein the operation of said device is not suspended when a no call bill is encountered.

176. The discrimination device of claim 175 wherein the values of any no call bills are added to appropriate ones of said one or more counters through the use of said value indicating means after all the bills placed in said input receptacle have been processed.

177. The discrimination device of claim 176 having exactly two output receptacles.

178. The discrimination device of claim 176 wherein said value indicating means comprise denomination selection elements.

179. The discrimination device of claim 175 wherein the value of a no call bill may be added to appropriate ones of said one or more counters through the use of said value indicating means any time after said no call bill has been identified.

180. The discrimination device of claim 179 having exactly two output receptacles.

181. A currency counting and discrimination device for receiving a stack of currency bills, rapidly counting and discriminating the bills in the stack, and then re-stacking the bills comprising:

an input receptacle for receiving a stack of currency bills to be discriminated;

a full image scanner for discriminating the denomination of said currency bills;

one or more output receptacles for receiving said currency bills after being discriminated by said discriminating unit;

a transport mechanism for transporting said currency bills, one at a time, from said input receptacle past a sensor of said full image scanner and to said one or more output receptacles;

one or more counters keeping track of the value of bills discriminated;

value indicating means for an operator of said device to indicate the value of any bills whose denomination are not determined by said full image scanner, said bills whose denomination are not determined by said full image scanner being no call bills, said means appropriately effecting said one or more counters; and

means for prompting an operator of the device as to the denomination of a no call bill.

182. The discrimination device of claim 181 wherein said value indicating means comprise denomination selection elements.

183. The discrimination device of claim 181 wherein said prompting means initially suggests that the denomination of a no call bill is the same as that of an immediately prior bill.

184. The discrimination device of claim 181 wherein said prompting means initially suggests that the denomination of a no call bill is the same as that of the last bill whose denomination was determined by said full image scanner.

185. The discrimination device of claim 181 wherein said prompting means initially suggests that the denomination of a no call bill is the same as that of the last bill that was a no call bill.

186. The discrimination device of claim 181 wherein said full image scanner determines the denomination of a bill by comparing a scanned data retrieved from said bill by said sensor with master data associated with one or more genuine bills and wherein said prompting means initially suggests that the denomination of a no call bill is the denomination associated with the master data that most closely matches the scanned data.

187. The discrimination device of claim 181 wherein said full image scanner determines the denomination of a bill by comparing a scanned pattern retrieved from said bill by said sensor with one or more master patterns associated with one or more genuine bills and wherein said prompting means initially suggests that the denomination of a no call bill is the denomination associated with the master pattern that most closely matches the scanned pattern.

188. The discrimination device of claim 187 wherein said full image scanner calculates a correlation number for each of said one or more master patterns based on said comparison between said scanned pattern and said one or more master patterns and wherein said prompting means initially suggests that the denomination of a no call bill is the denomination associated with the master pattern that has the highest correlation number.

189. The discrimination device of claim 181 further comprising means for permitting an operator of the device to select one or more denominations and their relative order to be suggested in connection with no call bills and wherein said prompting means suggests one or more denominations for a no call bill according to said selections made by said operator.

190. The discrimination device of claim 181 further comprising a memory for storing historical information regarding the denominations of previous no calls and wherein said prompting means suggests one or more denominations for a no call bill based on said historical information.

191. The discrimination device of claim 190 wherein said prompting means suggests one or more denominations for a no call bill based on the frequency of occurrence of no call bills for each of a plurality of denominations.

192. The discrimination device of claim 191 wherein said prompting means initially suggests the denomination that has had the highest frequency of no call bills.

193. A currency counting and discrimination device for receiving a stack of currency bills, rapidly counting and discriminating the bills in the stack, and then re-stacking the bills comprising:

an input receptacle for receiving a stack of currency bills to be discriminated;

a full image scanner for discriminating the denomination of said currency bills;

one or more output receptacles for receiving said currency bills after being discriminated by said full image scanner;

a transport mechanism for transporting said currency bills, one at a time, from said input receptacle past a sensor of said full image scanner and to said one or more output receptacles;

one or more counters keeping track of the value of bills discriminated;

means for flagging bills meeting or failing to meet to predetermined criteria;

value indicating means for an operator of said device to indicate the value of any flagged bills, said means appropriately effecting said one or more counters; and

a housing for said input receptacle, said discriminating unit, said one or more output receptacles, and said transport mechanism; wherein said value indicating means are affixed to said housing.

194. The discrimination device of claim 193 having a single output receptacle.

195. The discrimination device of claim 193 comprising two or more output receptacles and wherein no call bills are delivered to a different one of said output receptacles than bills whose denominations are determined by said full image scanner

196. The discrimination device of claim 195 wherein the operation of said device is not suspended when a no call bill is encountered.

197. The discrimination device of claim 196 wherein the values of any no call bills are added to appropriate ones of said one or more counters through the use of said value indicating means after all the bills placed in said input receptacle have been processed.

198. The discrimination device of claim 196 wherein said means for flagging flags a suspect bill by suspending the operation of said counting and discrimination device.

199. The discrimination device of claim 193 having exactly two output receptacles.

200. A currency counting and discrimination device for receiving a stack of currency bills, rapidly counting and discriminating the bills in the stack, and then re-stacking the bills comprising:

an input receptacle for receiving a stack of currency bills to be discriminated;

a full image scanner for discriminating the denomination of said currency bills;

one or more output receptacles for receiving said currency bills after being discriminated by said full image scanner;

a transport mechanism for transporting said currency bills, one at a time, from said input receptacle past a sensor of said full image scanner and to said one or more output receptacles;

one or more counters keeping track of the value of bills discriminated;

means for flagging bills meeting or failing to meet to predetermined criteria;

value indicating means for an operator of said device to indicate the value of any flagged bills, said means appropriately effecting said one or more counters; and

an inspection station and wherein no call bills are delivered to said inspection station.

201. A currency counting and discrimination device for receiving a stack of currency bills, rapidly counting and discriminating the bills in the stack, and then re-stacking the bills comprising:

an input receptacle for receiving a stack of currency bills to be discriminated;

a full image scanner for discriminating the denomination of said currency bills;

one or more output receptacles for receiving said currency bills after being discriminated by said full image scanner;

a transport mechanism for transporting said currency bills, one at a time, from said input receptacle past a sensor of said full image scanner and to said one or more output receptacles;

one or more counters keeping track of the value of bills discriminated;

means for flagging bills meeting or failing to meet to predetermined criteria; and

value indicating means for an operator of said device to indicate the value of any flagged bills, said means appropriately effecting said one or more counters;

wherein said predetermined criteria is said full image scanner identifying the denomination of a bill and wherein said flagging means flags a bill failing to be identified by said full image scanner by suspending the operation of said counting and discrimination

device, said device being halted so that said flagged bill is located at a predetermined position within said discrimination device when said transport mechanism stops.

202. The discrimination device of claim 201 having a single output receptacle and wherein the value of a no bill is added to appropriate ones of said one or more counters through the use of said value indicating means when the operation of said device is suspended and wherein the operation of the device is thereafter resumed.

203. The discrimination device of claim 201 having exactly two output receptacles and wherein the value of a no bill is added to appropriate ones of said one or more counters through the use of said value indicating means when the operation of said device is suspended and wherein the operation of the device is thereafter resumed.

204. The discrimination device of claim 201 comprising two or more output receptacles and wherein no call bills are delivered to a different one of said output receptacles than bills whose denominations are determined by said full image scanner.

205. A method of authenticating documents comprising the steps of:

illuminating a document with ultraviolet light;

obtaining a full video image of the document;

processing information from the video image of the document;

detecting ultraviolet light reflected by said document; and

determining the authenticity of said document based upon a comparison of the ultraviolet light reflected from said bill with the ultraviolet light reflected from a genuine document illuminated with ultraviolet light.

206. The method of claim 205 wherein said detecting step comprises the step of detecting the presence or absence of ultraviolet light reflected from one or more areas of said document.

207. The method of claim 205 wherein said detecting step comprises the step of detecting a pattern of ultraviolet light reflected by said document.

208. The method of claim 205 wherein said detecting step comprises the step of detecting the amount of ultraviolet light reflected from one or more areas of said document.

209. The method of claim 208 wherein the authenticity of said document is determined relative to genuine currency

210. An apparatus for currency discrimination, comprising;

first and second stationary scanheads, disposed on opposite sides of a bill transport path, for scanning and obtaining images of the respective full first and full second opposing surfaces of each bill of a plurality of bills traveling downstream along said bill transport path and for producing output signals associated with said respective first and second full surfaces of each bill, each scanned bill having a primary characteristic pattern on one of said first and second full surfaces and a secondary characteristic pattern on the other of said first and second full surfaces;

a memory for storing master primary characteristic patterns of a plurality of denominations of genuine bills;

sampling means for sampling said output signals associated with said respective first and second opposing full surfaces of each scanned bill; and

signal processing means for

(1) determining which surface of said first and second opposing full surfaces of each scanned bill includes said primary characteristic pattern in response to said first and second scanheads scanning portions of said first and second opposing full surfaces of each bill, and

(2) in response to determining which surface of said first and second full opposing surfaces of each scanned bill includes said primary characteristic pattern to a predetermined degree of certainty, correlating only an output signal associated with said surface of each scanned bill which includes said primary characteristic pattern with said master primary characteristic patterns to identify the denomination of each scanned bill.

211. The apparatus of claim 210, wherein said master primary characteristic patterns are on the green surfaces of United States currency bills.